

Grid Forming Inverter Market Forecasts to 2032 – Global Analysis By Type (Voltage Source Inverter (VSI), Current Source Inverter (CSI) and Hybrid Inverter), Component, Power Rating, Connectivity, Technology, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Grid Forming Inverter Market is accounted for \$0.85 billion in 2025 and is expected to reach \$1.67 billion by 2032 growing at a CAGR of 10.2% during the forecast period. The stable operation of microgrids and renewable energy systems is made possible by a type of power inverter called a Grid Forming Inverter (GFI), which creates and controls voltage and frequency in an electrical grid. Grid-forming inverters can function independently in islanded mode or in conjunction with other power sources, in contrast to grid-following inverters, which depend on an existing grid signal. They provide stability and inertia by simulating the actions of conventional synchronous generators. They are therefore crucial for incorporating significant amounts of renewable energy while preserving grid stability, particularly in remote locations or during outages.

According to the International Energy Agency, global renewable capacity additions could potentially reach 550 GW in 2024.

Market Dynamics:

Driver:

Rising renewable energy integration

Inertia and system stability become major issues when solar and wind energy grow on

the grid. By permitting steady voltage and frequency even in the absence of conventional synchronous generators, grid forming inverters solve these problems. They promote grid resilience by enabling renewables to behave similarly to traditional power sources. To reach decarbonisation targets, governments and utilities are spending more money on these inverters. Global demand for cutting-edge grid-forming technology is rising as a result of this trend.

Restraint:

High initial cost and complex implementation

The high cost of the infrastructure and equipment discourages many prospective customers from adopting this technology. Project deadlines may be delayed by the need for specialised staff and deep system integration for complex implementation procedures. These technical difficulties raise total expenses and operating risks. Deployment is further complicated by the absence of standardised installation techniques. Consequently, despite the long-term advantages of grid forming inverters, many organisations are hesitant to fully adopt them.

Opportunity:

Smart grid and microgrid expansion

One of the primary functions of grid-forming inverters is to provide voltage and frequency references, which these sophisticated power systems require. Grid-forming inverters facilitate steady and robust grid operations when decentralised renewable energy sources increase in number. These inverters are essential for microgrids to function independently or in grid-connected modes, particularly in isolated or disaster-prone locations. Additionally, dispersed energy supplies and dynamic loads are integrated into smart grids, necessitating clever and adaptable inverter technology. The continued need for grid-forming inverter solutions around the world is fuelled by this growing dependence.

Threat:

Technical standardization and interoperability issues

The absence of standardised standards complicates things for consumers and producers and slows down integration attempts. Because specialised solutions are

needed, this fragmentation raises development and deployment costs. Additionally, it restricts grid applications' scalability and adaptability, which prevents widespread adoption. Interoperability issues can create questions regarding the safety and dependability of the system when it is in use. All things considered, these problems impede market expansion by deterring investments and technological advancements in grid-forming inverters.

Covid-19 Impact

The COVID-19 pandemic initially disrupted the Grid Forming Inverter Market due to halted manufacturing, supply chain bottlenecks, and delayed renewable energy projects. However, as governments emphasized green recovery strategies and sustainable energy investments, demand for resilient and flexible grid solutions surged. This shift boosted interest in grid forming inverters for their ability to enhance grid stability and integrate renewables. Post-pandemic, increased focus on energy transition and grid modernization has accelerated the market's recovery and long-term growth prospects.

The current source inverter (CSI) segment is expected to be the largest during the forecast period

The current source inverter (CSI) segment is expected to account for the largest market share during the forecast period by offering enhanced stability and fault-tolerant capabilities in renewable-rich power systems. CSIs provide superior control over output current, which is crucial for grid-forming applications where maintaining grid voltage and frequency is essential. Their inherent short-circuit protection and ability to operate without requiring voltage feedback make them ideal for weak or islanded grids. Additionally, advancements in semiconductor technology have improved the efficiency and scalability of CSI-based solutions. As utilities transition toward decentralized and inverter-dominated grids, the demand for robust CSI technologies continues to grow steadily.

The defense & military segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the defense & military segment is predicted to witness the highest growth rate, due to its critical need for reliable, resilient power systems in remote and harsh environments. GFIs enable stable microgrids that support uninterrupted operations of sensitive defense equipment and communication networks.

Increasing adoption of renewable energy in military bases drives demand for advanced GFIs that can seamlessly manage variable power sources. Furthermore, military modernization programs emphasize energy security and grid independence, boosting GFI deployment. The requirement for mobile and autonomous power solutions in defense applications also accelerates innovation and market growth for GFIs.

Region with largest share:

During the forecast period, the Asia Pacific region is expected to hold the largest market share due to escalating renewable energy installations, especially solar and wind. Rapid urbanization and electrification efforts in emerging economies, alongside government incentives, encourage inverter deployment. The region faces unique challenges like grid instability and fluctuating power supply, increasing reliance on advanced inverter solutions to maintain grid reliability. Moreover, infrastructure modernization projects in countries like China and India create significant opportunities, with local and global manufacturers competing to meet the rising demand.

Region with highest CAGR:

Over the forecast period, the North America region is anticipated to exhibit the highest CAGR by increasing integration of renewable energy sources like solar and wind into the power grid. Growing government initiatives for grid modernization and energy storage solutions further accelerate market growth. The defense and military sectors also contribute due to their demand for reliable and resilient power systems. Advanced grid infrastructure in the U.S. and Canada supports adoption of grid forming inverters, enabling stable grid operation amid rising distributed energy resources and microgrid deployments.

Key players in the market

Some of the key players profiled in the Grid Forming Inverter Market include Huawei Technologies Co., Ltd., SMA Solar Technology AG, General Electric (GE), Sungrow Power Supply Co., Ltd., FIMER Group, SolarEdge Technologies Inc., Enphase Energy, Inc., Delta Electronics, Inc., Schneider Electric SE, Fronius International GmbH, GoodWe Power Supply Technology Co., Ltd., KACO new energy GmbH, Gamesa Electric, TMEIC Corporation, Mitsubishi Electric Corporation, ABB Ltd. and Ingeteam S.A.

Key Developments:

In March 2025, SMA America introduced the Sunny Central Storage UP-S, a high-efficiency grid-scale battery inverter featuring silicon carbide (SiC) MOSFET technology. This inverter boasts over 99.2% efficiency and supports dynamic grid support, making it suitable for large-scale energy storage projects.

In June 2024, Huawei introduced the world's first Cell-to-Grid Smart String & Grid-Forming ESS Platform. This platform integrates PV, energy storage systems (ESS), and grid-forming capabilities, enhancing the stability and efficiency of renewable energy integration. Notably, in a project in Qinghai, China, the system increased renewable energy output by 40% when the short circuit ratio (SCR) was 1.5.

Types Covered:

Voltage Source Inverter (VSI)

Current Source Inverter (CSI)

Hybrid Inverter

Components Covered:

Hardware

Software

Services

Power Ratings Covered:

Up to 10 kW

10 kW – 100 kW

Above 100 kW

Connectivities Covered:

On-grid

Off-grid

Hybrid

Technologies Covered:

Droop Control

Virtual Synchronous Machine (VSM)

Synchronous Condenser Emulation

Machine Learning Enabled Control

End Users Covered:

Residential

Commercial

Industrial

Utilities

Defense & Military

Other End Users

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

What our report offers:

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2024, 2025, 2026, 2028, and 2032
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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